

For genera or groups whose living members show a wide ecological diversity, therefore, the only available grounds for historical theories covering the Tertiary Epoch are geographical and taxonomic evidence and the mere analogy of general floral and faunal histories. Dr Verity's theories would seem to be so grounded. Dr Beirne's theories, which do not try to go so far back, have a similar basis, except that the emphasis is rather on the geographical and geological than the taxonomic evidence. For groups sharply characterised ecologically, ecological analogy would be a good additional basis for theorisation.

Most of such theorisation is at present impeded by our lack of full ecological evidence for the forms and species under consideration and by the lack of adequate geological evidence regarding all the regions involved. These objections do not apply to Dr Beirne's findings, which are confined to regions well studied geologically and comparatively well studied ecologically. While it is most improbable that enough butterfly or moth fossils will be discovered to provide factual proof of lepidoptera-histories, it is not unreasonable to hope that one day our geological and ecological data will render far-reaching theories less speculative.

If the above general principles are sound, the following will be the more fruitful directions of activity for lepidopterists interested in zoogeography:—Firstly, taxonomic studies with the aim of grouping phylogenetically the geographical forms of a species and the different species of a group; secondly, ecological studies, determining the limiting factors of each species and defining the biotope or biotopes in which it is found and its status in each; thirdly, the exploration of little known regions with the aim of drawing up faunal lists in which taxonomic and ecological accuracy is essential. On the negative side, these lepidopterists should firstly refrain from wasting their energies drawing up local lists of well-known territory without ecological precision, and, secondly, should restrict their historical theories to the Pleistocene Epoch or to groups with a well-characterised ecology. The geography of Lepidoptera can also make little progress without the co-operation of the geologist abroad, especially in the close study of Tertiary and Recent rocks and deposits, our knowledge of which is still very defective. Finally, the lepidopterist-geographer must to a great extent resign himself to laying the ground-work for the future historical reconstructions that cannot at present safely be made.

SUBSTITUTE FOOD-PLANTS.

By D. G. SEVASTOPULO, F.R.E.S.

Mr Wiltshire's recent article under this title in this Journal (1943, iv, pp. 79-85) has tempted me to classify the hundred and thirty odd species of Lepidoptera that I have bred in Calcutta during the last few years, and whose food-plants have been identified, on similar lines and see if they would also fall into tidy groups. The results were interesting: 136 species were involved and fed on 70 different food-plants; of these 100 species feeding on 42 different plants could be connected by starting from one plant and listing the species feeding on it, then taking the other food-plants of these species and so on. It is possible that an even

greater degree of linking up could have been achieved if I had worked from recorded food-plants instead of from my own observations in Calcutta only. *Prodenia litura*, F., for instance, is recorded from over seventy plants ranging from Cauliflowers to Bananas against the eight species on which I have found it. I have not included any Psychids in my list, firstly because they seem to be truly polyphagous and can be fed first on one thing and then on another without any trouble, and secondly because many of the identifications seem open to doubt.

In the list that follows the species are grouped under the different food-plants, the numbers in brackets after certain species referring to the other plants on which the species feeds. In a few cases species are marked with an asterisk. These are species that have been bred from ova laid in captivity and on what was almost certainly an unnatural food-plant as only a few stunted imagines were reared.

1. *Michelia champaca* (MAGNOLIACEAE).
Graphium doson, Esp. (Papilionidae)—(2).
2. *Polyalthia longifolia* (ANNONACEAE).
G. doson—(1); *Thalassodes quadraria*, Guen. (Geometridae).
3. *Tinospora cordifolia* (MENISPERMACEAE).
Aitha nivea, Wlk. (Limacodidae)—(61); *Ophideres fullonica*, L. (Noctuidae); *Argadesa materna*, L. (Noctuidae).
4. *Argemone mexicana* (PAPAVERACEAE).
Prodenia litura, F. (Noctuidae)—(38, 39, 42, 51, 58, 61, 68).
5. *Capparis horrida* (CAPPARIDACEAE).
Leptostia nina, F. (Pieridae); *Cepora nerissa*, F. (Pieridae); *Anapheis aurota*, F. (*Belenois mesentina*, Cr.) (Pieridae); *Valeria valeria*, F. (Pieridae); *Portheia scintillans*, Wlk. (Lymantriidae)—(16, 31, 36, 37, 53, 54, 61).
6. *Flacourtia* sp. (BIXACEAE).
Atella phalanta, Drury (Nymphalidae).
7. Garden Carnation (CARYOPHYLLACEAE).
Chloridea obsoleta, F. (Noctuidae)—(51).
8. *Sida rhombifolia* (MALVACEAE).
Syrichthus galba, F. (Hesperiidae).
9. Garden Hollyhock (MALVACEAE).
Phytometra eriosoma, Dbl. (Noctuidae); *Cosmophila erosa*, Hbn. (Noctuidae); *Sylepta derogata*, F. (Pyralidae)—(10).
10. *Hibiscus rosa-sinensis* (MALVACEAE).
S. derogata—(9).
11. *Oxalis corniculata* (GERANIACEAE).
Zizeeria maha, Koll. (Lycaenidae).
12. Garden Balsam (GERANIACEAE).
Theretra oldenlandiae, F. (Sphingidae)—(68); *Zinckenia perspectalis*, Cr. (Pyralidae).
13. *Citrus* spp. (RUTACEAE).
Papilio polytes, L. (Papilionidae)—(14); *Papilio demoleus*, L. (Papilionidae)—(14); *Chilades latus*, Cr. (Lycaenidae).
14. *Aegle marmelos* (RUTACEAE).
P. polytes—(13); *P. demoleus*—(13).
15. *Melia azadirachta* (MELIACEAE).
Trabala rishnu, Lef. (Lasiocampidae)—(30, 32, 61).
16. *Zizyphus jujuba* (RHAMNACEAE).
Tarucus nara, Koll. (Lycaenidae); *Nola fuscibasalis*, Hamp. (Arctiidae); *P. scintillans*—(5, 31, 36, 37, 53, 54, 61); *Euproctis guttata*, Wlk. (Lymantriidae)—(31, 45); *Thosea tripartita*, Moore (Limacodidae)—(61); *Beara dichromella*, Wlk. (Noctuidae); *Petelia medardaria*, H.-Sch. (Geometridae).
17. *Vitis* sp. (VITACEAE).
Theretra clotho, Drury (Sphingidae).
18. *Nephelium litchi* (SAPINDACEAE).
Rathinda amor, F. (Lycaenidae)—(34); *Pingasa ruginaria*, Guen. (Geometridae).
19. *Mangifera indica* (ANACARDIACEAE).
Euthalia garuda, Moore (Nymphalidae); *Dasychira mendosa*, Hbn. (Lymantriidae)—(31, 36, 61); *Lymantria nigra*, Moore (Lymantriidae); *Lymantria*

- ampla*, Wlk. (Lymantriidae)—(31, 61, 67); *Parasa lepida*, Cr. (Limacodidae)—(25, 26, 32, 33, 67).
20. Garden Pea (LEGUMINOSAE).
Cosmolyce boeticus, L. (Lycaenidae)—(21).
21. Lupin (LEGUMINOSAE).
C. boeticus—(20).
22. *Aeschynomene indica* (LEGUMINOSAE).
Scopula emissaria, Wlk. (Geometridae).
23. *Phaseolus* sp. (LEGUMINOSAE).
Striglina scitaria, Wlk. (Thyrididae).
24. *Rhynchosia minima* (LEGUMINOSAE).
Zizeeria trochilus, Frr. (Lycaenidae); *Mocis undata*, F. (Noctuidae); *Chalcope hyppasia*, Cr. (Noctuidae).
25. *Pterocarpus indica* (LEGUMINOSAE).
P. lepida—(19, 26, 32, 33, 67).
26. *Cassia fistula* (LEGUMINOSAE).
Catopsilia crocale, Cr. (Pieridae)—(27); *Catopsilia pomona*, F. (Pieridae)—(27); *Stauropus alternus*, Wlk. (Notodontidae)—(61); *Xyleutes leuconotus*, Wlk. (Cossidae)—(Internal feeder); *Thosea cana*, Wlk. (Limacodidae); *P. lepida*—(19, 25, 32, 33, 67); *Ericia inangulata*, Guen. (Noctuidae); *Buzura suppressaria*, Guen. (Geometridae)—(27, 31, 45); *Trachylepidia fructicassia*, Rag. (Pyralidae)—(Seeds); *Phryganodes analis*, Snell. (Pyralidae).
27. *Cassia siamea* (LEGUMINOSAE).
C. crocale—(26); *C. pomona*—(26); *B. suppressaria*—(26, 31, 45).
28. *Albizia stipulata* (LEGUMINOSAE).
Polydesma umbricola, Bsd. (Noctuidae).
29. Garden Rose (ROSACEAE).
Trypanophora semihyalina, Koll. (Zygaenidae)—(31, 32, 33, 45, 61); *Achaea melicerte*, Drury (Noctuidae)—(61); *Thalassodes veraria*, Guen. (Geometridae)—(35).
30. *Quisqualis indica* (COMBRETACEAE).
Rapala schistaceae, Moore (Lycaenidae); *Roeselia fola*, Swinh. (Arctiidae); *Euproctis subfasciata*, Wlk. (Lymantriidae); *T. vishnu*—(15, 32, 61); *Eupterote undata*, Blch. (Eupterotidae)—(52, 60, 67, 69); *Anua coronata*, F. (Noctuidae).
31. *Lagerstroemia indica* (LYTHRACEAE).
T. semihyalina—(29, 32, 33, 45, 61); *D. mendosa*—(19, 36, 61); *Orgyia postica*, Wlk. (Lymantriidae); *L. ampla*—(19, 61, 67); *Leucoma submarginata*, Wlk. (Lymantriidae)*; *Porthesia xanthorrhoea*, Koll. (Lymantriidae); *P. scintillans*—(5, 16, 36, 37, 53, 54, 61); *E. guttata*—(16, 45); *Eupterote geminata*, Wlk. (Eupterotidae); *Natada suffusa*, Moore (Limacodidae)—(45); *Selepa celtis*, Moore (Noctuidae); *Symitha nolalella*, Wlk. (Noctuidae)—(32); *B. suppressaria*—(26, 27, 45).
32. *Lagerstroemia flos-reginae* (LYTHRACEAE).
T. semihyalina—(29, 31, 33, 45, 61); *T. vishnu*—(15, 30, 61); *P. lepida*—(19, 25, 26, 33, 67); *S. nolalella*—(31).
33. *Gardenia florida* (RUBIACEAE).
T. semihyalina—(29, 31, 32, 45, 61); *Cephonodes hylas*, L. (Sphingidae)—(34); *P. lepida*—(19, 25, 26, 32, 67).
34. *Ixora coccinea* (RUBIACEAE).
R. amor—(18); *C. hylas*—(33).
35. Garden Chrysanthemum (COMPOSITAE).
T. veraria—(29).
36. Garden Sunflower (COMPOSITAE).
Diacrisia obliqua, Wlk. (Arctiidae)—(39, 49, 51); *D. mendosa*—(19, 31, 61); *P. scintillans*—(5, 16, 31, 37, 53, 54, 61).
37. Orange Cosmos (COMPOSITAE).
Amata passalis, F. (Syntomidae)*—(39*); *Amata cysssea*, Cr. (Syntomidae)*—(39*); *Amsacta lineola*, F. (Arctiidae)*; *Cretonotus transiens*, Wlk. (Arctiidae)—(39, 69); *P. scintillans*—(5, 16, 31, 36, 53, 54, 61); *Prospalta capensis*, Guen. (Noctuidae)—(41).
38. Garden Zinnia (COMPOSITAE).
P. litura—(4, 39, 42, 51, 58, 61, 68).
39. Garden Dahlia (COMPOSITAE).
*A. passalis**—(37*); *A. cysssea**—(37*); *D. obliqua*—(36, 49, 51); *C. transiens*—(37, 69); *Pericallia ricini*, F. (Arctiidae)—(61); *Utetheisa lotrix*, Cr. (Arctiidae)*—(49); *P. litura*—(4, 38, 42, 51, 58, 61, 68).

40. Garden Coreopsis (COMPOSITAE).
Prospalta pallidipennis, Warr. (Noctuidae).
41. Garden Calendula (COMPOSITAE).
P. capensis—(37).
42. Garden Lettuce (COMPOSITAE).
P. litura—(4, 38, 39, 51, 58, 61, 68).
43. Mimusops elengi (SAPOTACEAE).
Metanastria hyrtaca, Cr. (Lasiocampidae).
44. Jasminum sambac (OLEACEAE).
Glyphodes unionalis, Hbn. (Pyralidae); *Lepyrodes neptis*, Cr. (Pyralidae).
45. Carissa carandas (APOCYNACEAE).
Euploea core, Cr. (Danaidae)—(47, 63); *T. semihyalina*—(29, 31, 32, 33, 61); *Euproctis lunata*, Wlk. (Lymantriidae); *E. guttata*—(16, 31); *Estigena pardalis*, Wlk. (Lasiocampidae); *Nephete didyma*, F. (Sphingidae); *N. suffusa*—(31); *Agathia laetata*, F. (Geometridae)—(47); *B. suppressaria*—(26, 27, 31).
46. Tabernaemontana coronaria (APOCYNACEAE).
Deilephila nerii, L. (Sphingidae)—(47); *Glyphodes vertumnalis*, Guen. (Pyralidae).
47. Nerium odorum (APOCYNACEAE).
E. core—(45, 63); *D. nerii*—(46); *A. laetata*—(45); *Agathia lycanaria*, Koll.
48. Calotropis procera (ASCLEPIADACEAE).
Danaus chrysipus, L. (Danaidae); *Pyrausta incoloralis*, Guen. (Pyralidae).
49. Heliotropium indicum (BORAGINACEAE).
D. obliqua—(36, 39, 51); *U. lotrix*—(39*); *Utetheisa pulchelloides*, Hamps. (Arctiidae).
50. Ipomoea palmaja (CONVOLVULACEAE).
Herse convolvuli, L. (Sphingidae).
51. Garden Antirrhinum (SCROPHULARIACEAE).
D. obliqua—(36, 39, 49); *P. litura*—(4, 38, 39, 42, 58, 61, 68); *C. obsoleta*—(7); *Phytometra jessica*, Btlr. (Noctuidae).
52. Lantana camara (VERBENACEAE).
E. undata—(30, 60, 67, 69).
53. Lantana sellowiana (VERBENACEAE).
P. scintillans—(5, 16, 31, 36, 37, 54, 61); *Scopula cleoraria*, Wlk. (Geometridae).
54. Clerodendrum infortunatum (VERBENACEAE).
P. scintillans—(5, 16, 31, 36, 37, 53, 61).
55. Duranta ellisii (VERBENACEAE).
Acherontia lachests, F. (Sphingidae).
56. Boerhaavia repens (NYCTAGINACEAE).
Hippotion boerhaviae, F. (Sphingidae).
57. Amaranthus sp. (AMARANTACEAE).
Ilattia octo, Guen. (Noctuidae).
58. Spinacia oleracea (CHENOPODIACEAE).
P. litura—(4, 38, 39, 42, 51, 61, 68).
59. Aristolochia sp. (ARISTOLOCHIACEAE).
Polydorus aristolochiae, F. (Papilionidae).
60. Alseodaphne semecarpifolia (LAURACEAE).
Chitasa clytia, L. (Papilionidae); *E. undata*—(30, 52, 67, 69).
61. Ricinus communis (EUPHORBIACEAE).
Ergolis merione, Cr. (Nymphalidae); *T. semihyalina*—(29, 31, 32, 33, 45); *P. ricini*—(39); *D. mendosa*—(19, 31, 36); *L. ampla*—(19, 31, 67); *P. scintillans*—(5, 16, 31, 36, 37, 53, 54); *T. vishnu*—(15, 30, 32); *S. alternus*—(26); *N. suffusa*—(31); *T. tripartita*—(16); *A. nivea*—(3); *Narosa doenia*, Moore (Lamacodidae); *P. litura*—(4, 38, 39, 42, 51, 58, 68); *A. melicerte*—(29); *Parallelia algira*, L. (Noctuidae); *Hyposidra talaca*, Wlk. (Geometridae); *Dichocrocis punctiferalis*, Guen. (Pyralidae)—(seeds).
62. Streblus asper (URTICACEAE).
Ocinara varians, Wlk. (Bombycidae)—(63, 64).
63. Ficus religiosa (URTICACEAE).
E. core—(45, 47); *Aganais ficus*, F. (Arctiidae); *O. varians*—(62, 64); *Perina nuda*, F. (Lymantriidae)—(64); *Attatha ino*, Drury (Noctuidae); *Glyphodes bivitalis*, Guen. (Pyralidae).
64. Ficus bengalensis (URTICACEAE).
O. varians—(62, 63); *P. nuda*—(63).
65. Ficus hispida (URTICACEAE).
Asota caricae, Bsd. (Arctiidae).

66. LILIACEAE generally.
Polytela gloriosae, F. (Noctuidae); *Calogramma festiva*, Don. (Noctuidae).
67. PALMACEAE generally.
Elymnias hypermnestra, L. (Satyridae); *Suastus gremius*, F. (Hesperiidae); *L. ampla*—(19, 31, 61); *E. undata*—(30, 52, 60, 69); *Thosea loesa*, Moore (Lima-codidae); *P. lepida*—(19, 25, 26, 32, 33).
68. AROIDEAE generally.
T. oldenlandiae—(12); *Theretra pinastrina*, Mart. (Sphingidae); *Rhyncholaba acteus*, Cr. (Sphingidae); *P. ntura*—(4, 38, 39, 42, 51, 58, 61).
69. Grasses (GRAMINEAE).
Mycalopsis perseus, F. (Satyridae); *Mycalopsis visata*, Moore (Satyridae); *Ypthima huebneri*, Kirby (Satyridae); *Melanitis leda*, L. (Satyridae); *Baoris zelleri*, Led. (Hesperiidae); *C. transtiens*—(37, 39); *Dasychira pennatula*, F. (Lymantriidae); *Laetia exclamaticis*, Koll. (Lymantriidae); *E. undata*—(30, 52, 60, 67); *Agrotis spinifera*, Hbn. (Noctuidae); *Sideridis insularis*, Btlr. (Noctuidae); *Sideridis yu*, Guen. (Noctuidae); *Sideridis venalba*, Moore (Noctuidae); *Spodoptera mauritia*, Bsd. (Noctuidae); *Spodoptera pecten*, Guen. (Noctuidae); *Spodoptera ciliun*, Guen. (Noctuidae); *Mocis frugalis*, F. (Noctuidae).
70. Bamboo (GRAMINEAE).
Matapa aria, Moore (Hesperiidae); *Astycus pythias*, Mab. (Hesperiidae); *Crocidophora ptyophora*, Hamps. (Pyralidae).
Calcutta, 2.iv.44.

NEW FOREST AND DISTRICT NOTES.

By S. G. CASTLE RUSSELL.

In continuation of my Notes in your last issue, since 1st May there has been very little increase in the number of butterflies on the wing, perhaps due to the persistent cold winds that blow from all directions. Although the Highcliffe and New Milton district is well wooded with several promising looking localities, daily walks through these have disclosed nothing but an occasional *Pararge aegeria*, L., *Pararge megera*, L., *Gonepteryx rhamni*, Linn., and the common "whites." Most of the butterflies in the neighbourhood congregate on a small sheltered length of the local railway bank. Here are to be seen in small numbers all the species that inhabit this district. On 2nd May I saw here three male *Colias croceus*, Fourcy., but I have seen none since, and fear that the sudden cold and windy blitz that set in at that day was too much for the colony that may have arrived on this coast. Recently, whilst descending the bank to look at a ♀ *Lycaena phlaeas*, L., I disturbed, quite close, a white form which after capture and examination turned out to be a small male in fresh condition of a colour intermediate between ab. *alba* and ab. *schmidtii*. Shortly after, much to my surprise, I netted a fresh male of *Melitaea cinxia*, L. This I surmise has arrived from the I. of Wight, the nearest place where it occurs, some 12 miles as the crow flies. I know of a local collector who is running a number of the larvae, but he tells me that no imago has as yet emerged in his cages. In past years a few have been seen on the wing at Hurst Castle in the very limited area there, and along this coast there are undercliffs which might well harbour the species. From my own experience I know that *M. cinxia*, like *M. aurinia*, will wander many miles away from its place of birth, or where it has been put down for stocking purposes.

On 18th May I went to the Ladycross district in company with Mr Clarke of Brockenhurst. The weather was against us, however, and in